

## CLAIMS

### WHAT IS CLAIMED IS:

1           1.       In a system for presenting an audio stimulus having an input, an amplifier, an  
2 attenuator and a transducer, a method of predicting a sound pressure level emitted by the  
3 transducer comprising:  
4           applying a broadband audio signal to the input;  
5           inserting a first attenuation between the amplifier and the transducer;  
6           measuring a first output from the transducer;  
7           calculating a first transfer function for a signal path from the input to the measured first  
8 output;  
9           inserting a second attenuation between the amplifier and the transducer;  
10          measuring a second output from the transducer;  
11          calculating a second transfer function for a signal path from the input to the measured  
12 second output;  
13          combining the first and second transfer functions to solve for a characteristic impedance  
14 and sensitivity of the transducer;  
15          calculating a sound pressure level emitted by the transducer as a function of input signal  
16 and attenuation.

1           2.       The method of claim 1 further comprising measuring the broadband audio signal  
2 applied at the input simultaneously with measuring the first and second outputs from the  
3 transducer.



1 8. The method of claim 6 wherein the sound pressure level is calculated as:

$$2 \quad 10\log_{10} \left( \frac{\sum_f \left| Y_X(f) \cdot H_{D2E}(f) \cdot H_{BD}(f, R_1, A, Z_L) \cdot \frac{H_{ATTN}(f, R_A, Z_L)}{H_{ATTN}(f, R_1, Z_L)} \right|^2}{\sum_f \left| Y_{XREF}(f) \cdot H_{D2E}(f) \cdot H_{BD}(f, R_1, A, Z_L) \right|^2} \right) + N.$$

1 9. The method of claim 6 wherein the sound pressure level is calculated as:

$$2 \quad 20\log_{10} \left( \sqrt{\frac{\sum_f \left| Y_X(f) \cdot H_{D2E}(f) \cdot H_{BD}(f, R_1, A, Z_L) \cdot \frac{H_{ATTN}(f, R_A, Z_L)}{H_{ATTN}(f, R_1, Z_L)} \cdot H_{A-W}(f) \right|^2}{M}} \times \frac{1}{H_{A2E}(f) \cdot p_0} \right).$$

1 10. The method of claim 6 wherein the sound pressure level is calculated as:

$$2 \quad 10\log_{10} \left( \frac{\sum_f \left| Y_X(f) \cdot H_{D2E}(f) \cdot H_{BD}(f, R_1, A, Z_L) \cdot \frac{H_{ATTN}(f, R_A, Z_L)}{H_{ATTN}(f, R_1, Z_L)} \cdot H_{A-W}(f) \right|^2}{\sum_f \left| Y_{XREF}(f) \cdot H_{D2E}(f) \cdot H_{BD}(f, R_1, A, Z_L) \right|^2} \right) + N.$$

1 11. The method of claim 1 wherein the transducer is an acoustic transducer.

1 12. The method of claim 1 wherein the transducer is a vibratory transducer.

1 13. The method of claim 1 wherein the transducer is characterized by a transfer  
2 function and further comprising inserting an inverse filter to equalize the transducer transfer  
3 function.

1            14.    The method of claim 1 wherein the attenuator is characterized by a transfer  
2    function and further comprising inserting an inverse filter to equalize the attenuator transfer  
3    function.

1            15.    The method of claim 1 wherein the solution for the characteristic impedance of  
2    the transducer is expressed as a function of frequency.

1            16.    The method of claim 1 wherein the solution for the sensitivity of the transducer is  
2    expressed as a function of frequency.

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